



Photo by Ken Hammond, USDA

# WEIGHING INCENTIVES FOR FOOD SAFETY IN MEAT AND POULTRY

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Two massive recalls of ground beef and turkey luncheon meats linked to foodborne illnesses in the Midwest and Northeast in the fall of 2002 put food safety concerns back in the headlines. These unusually large recalls are part of an increasing number of meat and poultry recalls over the past several years (see box, "Recalls on the Rise").

Despite these troubling signs about the safety of meat and poultry products, industry and government regulators have been taking steps to improve food safety and, in fact, the increase in recalls signals more diligence and better detection technology. Market mechanisms, such as product branding and stricter food safety requirements imposed on suppliers by large buyers, are bolstering the levels of food safety in some cases above those required under regulation.

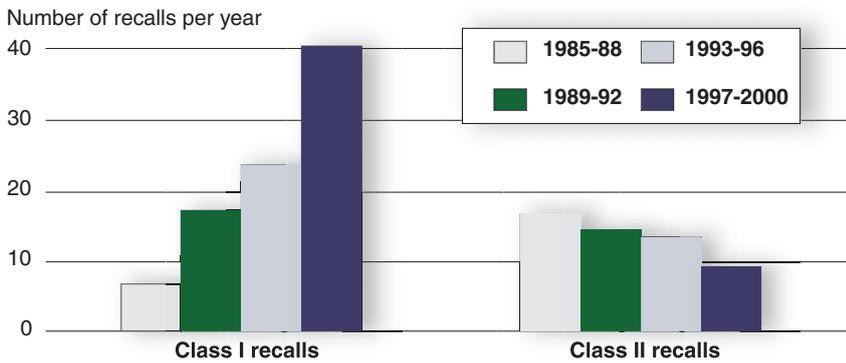
### Recalls on the Rise

The number and size of recalls have increased dramatically over the last decade. During 1993-96, the number of meat and poultry Class I recalls averaged about 24 per year and amounted to 1.5 million pounds annually. During 1997-2000, Class I recalls averaged 41 per year and reached 24 million pounds annually. Class I recalls involve meat or poultry products that could, especially without cooking to safe temperatures, cause serious illness or death. Class II and III recalls have little chance of being harmful.

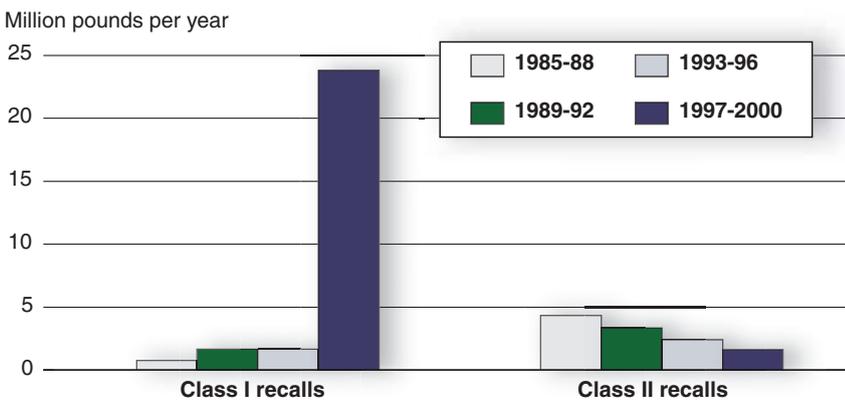
Three regulatory changes help explain why recalls have increased. First, in 1989, USDA's Food Safety and Inspection Service (FSIS) declared *Listeria monocytogenes* in ready-to-eat meat and poultry to be an adulterant, adopted a zero tolerance policy (no detectable level permitted), and began testing meat and poultry for this pathogen. In 1994, FSIS took the same action for *E. coli* O157:H7 in ground beef. These pathogens account for most of the Class I recalls. Second, FSIS began testing a larger sample of meat and poultry for pathogens in 1997 and introduced a new, more sensitive testing technology in 1999. Third, the Centers for Disease Control and Prevention (CDC) is becoming more adept at identifying foodborne illness outbreaks as it gains more experience in tracking such diseases.

These regulatory changes are reflected in recent recall trends. Class II recalls—for which there were minimal regulatory changes—declined both in number and pounds of output during the same period that Class I recalls skyrocketed.

#### Class I recalls rose dramatically in 1997-2000 but Class II recalls declined. . .



#### And volume of recalls followed the same pattern



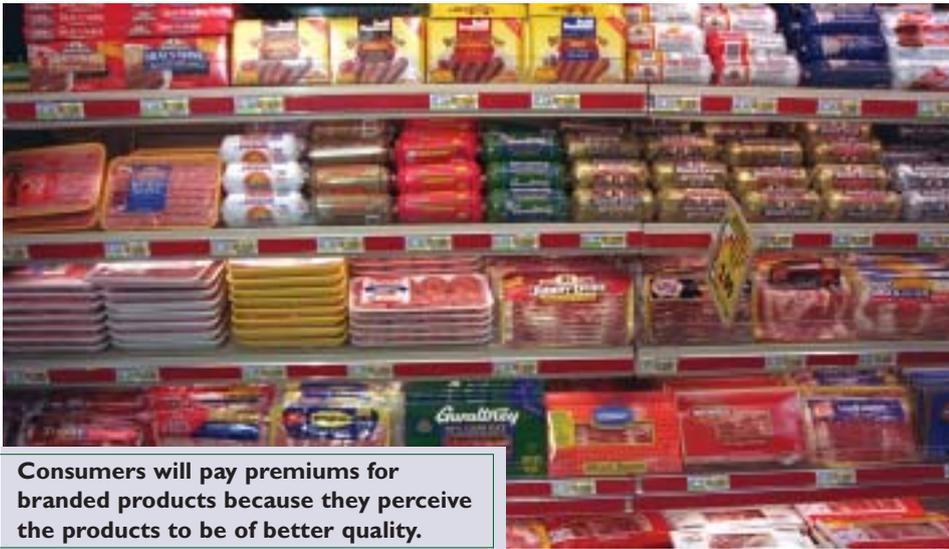
### Branding Encourages Food Safety...

Consumers surely want safe food every bit as much as they want food that looks appealing, tastes good, and is convenient to prepare. However, unlike fat content, consumers cannot accurately measure food safety. For example, many consumers who experience food-related illnesses believe their illness is due to a virus or to some other nonfood source. Even if consumers connect an illness with a particular food—such as hamburger—they may not know which company's hamburger to avoid because many meat products bear only store labels. Although consumers could stop purchasing meat or poultry (or all their groceries) from a particular store, consumers know that this action does not likely punish the producer.

Stores often have many suppliers of meat and poultry products, so they cannot simply withdraw business from low-quality producers because they cannot always identify them. Or, the store may be a small customer of a large producer, making it difficult to elicit change.

Food suppliers recognize that some consumers will pay premiums for branded products because they are perceived to be of better quality. Oscar Mayer in luncheon meats, Tyson Foods in poultry, and Smithfield Farms in pork are companies that have developed branded products connoting better quality.

The downside for these companies is that the brand may also be used to more readily identify the company as the source of a foodborne illness. Producers of branded products invest a lot of money into promoting product quality and will see that investment evaporate if a serious food safety breach occurs. Bil Mar foods, producer of Ball Park hotdogs, for example, spent more than \$100 million during 1998-2000 to improve food safety and convince con-



Consumers will pay premiums for branded products because they perceive the products to be of better quality.

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sumers of its products' safety after USDA's Food Safety and Inspection Service (FSIS) determined that it was producing products contaminated by the pathogen *Listeria monocytogenes*. Researchers at the University of Arkansas found that food recall announcements by publicly traded companies cause stock prices of affected firms to decline.

As a consequence, producers of branded products must invest more in food safety than producers of unbranded products, suggesting that recent trends toward higher sales of branded fresh meat cuts, such as pork roasts, should enhance food safety. Unfortunately, lower cost ground meats have the highest likelihood of pathogen contamination and, except for irradiated meats, these are less likely to be branded.

### ...As Do Customer Requirements

Food processors are not alone in the quest for safer food. Large restaurant chains spend millions of dollars promoting an image of tastiness, convenience, restaurant cleanliness, and product safety. Losing this image can be very costly. Jack In The Box, McDonald's, other major restaurant chains, and an increasing number of grocery stores and wholesalers routinely set strict food safety controls for their suppli-

ers, and cease contractual arrangements with those that do not comply. Burger King, for example, terminated a contract with Hudson Meats, forcing that company to exit the industry, after it underwent a huge recall of its meat products due to *E. coli* O157:H7 contamination.

Export markets are another lucrative market for meat and poultry companies. Like other major customers, many importing countries impose strict standards and pathogen testing on sellers. For example, South Korea rejected U.S. hot dogs in 1999 because they were contaminated with *Listeria monocytogenes*, and Russia voiced persistent concerns over the food safety of U.S. poultry throughout 2002.

ERS researchers recently completed a survey of almost 1,000 meat and poultry slaughter and processing plants. The survey covered numerous aspects of food safety controls and their costs. Among other findings, it provides new evidence that contractual arrangements covering food safety standards between meat and poultry plants and their buyers result in higher levels of food safety in five categories: equipment, testing, dehiding, sanitation, and operating procedures.

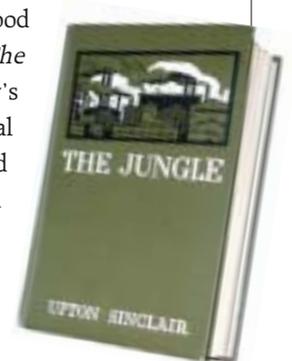
### Legal Liability Provides Limited Incentives

The legal liability system forces producers to make food safety investments up to the point at which the probability that the plant's products would be identified as the cause of an illness would be a very low. However, the incentives of the legal system limit food safety investment. Litigation is costly and most foodborne illnesses result in relatively minor gastrointestinal distress, such as diarrhea, that is either not recognized as food-related or not thought to be serious enough to pursue in court. Also, ERS research has shown that plaintiffs are unlikely to receive awards in foodborne illness trials, even in the case of a major illness, because rarely can the plaintiff make a certain link between a particular food and the sickness.

This is not to say that court actions are completely ineffective, however. Besides the costs associated with a rare loss in court, a highly publicized trial can severely harm a firm's image. To reduce this threat, companies often make out-of-court settlements.

### Evolving Regulations Buttress Economic Incentives

Food safety regulation in the United States dates to 1890 when *trichinae*, tiny worms in hogs, emerged as a public and animal health problem (see box, "Milestones in Food Safety Regulation"). *The Jungle*, Upton Sinclair's 1906 exposé of the brutal working conditions and unsanitary practices in Chicago meatpacking plants, led to the passage of the Federal Meat Inspection Act of 1906. Legislation in 1967 and 1968 addressed the use of inexpensive nonmeat fillers in meat products and extended FSIS's regulatory jurisdiction over a wider array of meat and poultry plants. Regulations based



on the legislation also established cooking times, temperature minimums, and other processing standards.

Regulatory changes occurring after the 1968 legislation greatly increased FSIS inspection requirements and forced FSIS to shift inspection priorities. One key change was implementation of voluntary process control programs that reduced some FSIS tasks. However, industry did not widely adopt the programs, most likely because companies calculated the added costs of the programs to be greater than the expected market benefits.

By 1980, some of the earlier problems addressed by regulation had receded from public view because regulatory, technological, and industrial changes resolved them. Public attention turned to *Salmonella* and other human pathogens, such as *E. coli* O157:H7, that lived in an animal's gastrointestinal tract without causing noticeable disease in the animal.

Food safety regulation entered a new era in 1989 when *Listeria monocytogenes* was declared an adulterant with a zero tolerance. Later, FSIS used the voluntary process control program framework as a model for a system of preventive controls known as Hazard Analysis and Critical Control Point (HACCP) program. Under a HACCP program, plants monitor points in their processing system that engender potential food safety hazards and take corrective actions when they suspect that a critical level of one of these points has been breached.

The 1996 Pathogen Reduction/HACCP rule mandated that meat and poultry plants develop and implement a system of standard operating procedures for sanitation and a HACCP program. Additionally, plants producing raw ground products or slaughtering animals have to adhere to *Salmonella* performance standards. Finally, slaughter plants have to also conduct *E. coli* testing to verify the adequacy of their process controls. PR/HACCP sanitation and process con-

trol requirements followed regulations mandated after the enactment of the 1967 and 1968 legislation. These regulations required plants to perform commonly accepted food safety practices, such as preventing contact between raw and cooked products and enforcing employee handwashing.

### Plants Perform Required Tasks

A team of FSIS process control inspectors enforces regulations by determining whether sanitation and process control systems are working to prevent adulteration. Inspectors examine recorded infor-

mation and conduct scheduled and unscheduled spot checks of various plant procedures. If an inspector together with a FSIS compliance officer determine that a plant is not properly performing tasks critical for safe food, they can decide that the task is out of compliance. In 1999, non-compliant HACCP tasks ranged from a high of about 5.5 percent in poultry slaughter plants to less than 2 percent for frozen meal/other food processors and for retailers and wholesalers.

These low noncompliance levels may lead one to believe that FSIS secures compliance through the exercise of strong

### Meat and poultry plants had less than 6 percent of HACCP tasks in noncompliance in 1999

Industry	Noncompliant tasks Percent
Red meat slaughter	2.6
Meat processing	1.4
Poultry slaughter and processing	5.5
Frozen meals and other packaged products containing some meat	1.5
Retailers and wholesalers	1.2

Source: U.S. Department of Agriculture, Food Safety and Inspection Service files and Enhanced Facilities Database.



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enforcement powers. However, FSIS has used its enforcement powers infrequently. If a plant has a chronic problem with sanitation or HACCP tasks, an inspector can impose a maximum penalty of temporarily shutting down the contaminated equipment or responsible department. Records for 1999-2001 indicate that FSIS issued an average of one of these types of penalties per 75 plants. Although a stronger action—plant closure by removal of inspection services—is possible, protracted court proceedings in the past have led FSIS to rarely use this enforcement tool. The high performance of sanitation and HACCP tasks in relation to the level of enforcement powers suggests that plants and their customers believe that these tasks are important to business performance.

**Food Safety Costly for Plants, But Barely Noticed by Consumers**

Understanding food safety costs helps regulators to evaluate how the industry may receive new regulations or amendments to existing regulations, and to assess the pros and cons for industry and consumers of regulatory changes.

In 2002, ERS extensively studied the costs of food safety regulation by estimating the cost of sanitation and process controls and of the PR/HACCP rule. ERS estimates that, before the PR/HACCP program began, required sanitation and process control tasks increased total production costs by a little more than 1 percent, or about \$850 million, per year for the meat and poultry industry. This compares to a gross margin of about 5 percent between value of shipments (or output) and animal, labor, and capital costs in red meat packing plants. For small plants, this margin is much smaller and may approach the cost of sanitation and process control. To the average supermarket shopper, the added

**Added cost to consumers from food safety measures is small**

Product	Increase in retail price
	Percent
Ground beef	0.8
Sirloin steak	.3
Chuck roast	.6
Center cut pork chops	.4
Ham <sup>1</sup>	1.8
Pork sausage <sup>1</sup>	1.3
Chicken breast	.3
Whole turkey	.6

<sup>1</sup>Includes costs from slaughter and processing operations.



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cost is so small as to have an almost unobservable impact on retail prices.

Interestingly, costs did not vary with plant size. Large plants had no special economic advantage in food safety process control. Costs were clearly lower for plants with poor sanitation and process control performance and higher for those with better performance.

ERS then estimated that PR/HACCP required another 1 percent of total costs on top of those incurred earlier for sanitation and process control tasks, which were still required. Plants that had advanced quality control programs before PR/HACCP paid

significantly less to implement the new requirements than plants with minimal controls. The combined costs translate into about 4 percent of the costs that plants can control—additional costs that are, once again, insignificant for retail prices but significant from the point of view of the plant's balance sheet.

The \$850 million in costs to plants due to PR/HACCP is likely passed on to consumers in the form of about a 1-percent increase in retail prices. As a point of contrast, consumers can now purchase irradiated meat products that supply near-perfect food safety. But irradiated products are not acceptable to all consumers and are

considerably more expensive than their untreated counterparts. Lancaster Farming reported that irradiated ground beef in October 2002 was priced 10-30 cents, or 5-10 percent, higher per pound than nonirradiated ground beef at Wegmans Food Markets in Pennsylvania. Other stores likely have similar price premiums.

**Poor Food Safety Performance Doesn't Pay in the Long Run**

If food safety controls cost plants money, it might seem that plants could do better economically with more lax sanitation and process controls. To the contrary, our studies indicate that, especially for certain types of plants, poor food safety performance does not pay over the long haul. ERS researchers found that sausage makers

and other companies that further process raw bulk meat and poultry, along with larger-than-average slaughter plants, with poor quality control records had 3-8 percent higher rates of exit from the industry than plants with better records. Only small slaughter plants appear to have benefited from skimping on food safety efforts.

It's easy to explain these results. Firms that make further processed meat and

**Exit rates were higher for large and medium-size plants with poor process control**

Process control performance <sup>1</sup>	Plant size <sup>2</sup>			
	Small	Medium	Large	All sizes
<i>Percent exits, 1992-96</i>				
<b>Slaughter plants:</b>				
Good	8.3	0	0	8.2
Average	9.6	7.4	2.9	8.5
Poor	4.0	15.0	7.1	7.1
All	8.9	8.6	4.1	8.3
<b>Processing plants:</b>				
Good	11.8	0	0	11.4
Average	10.0	8.7	4.8	9.2
Poor	15.0	14.8	7.3	12.8
All	10.7	9.3	5.4	9.9

<sup>1</sup>A plant with a good level of process control has a process control record that is superior to 90 percent of all the other plants, and a plant with poor process control has a record that is worse than 90 percent of all other plants in the industry. Plants that fall into neither one of these categories have an average rating.

<sup>2</sup>Small plants have less than one-half the average plant's output, large plants have twice the average plant's output, and medium plants are in between.



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## Milestones in Food Safety Regulation

### Meat Inspection Act of 1890 and various amendments during the 1890s

Ushered in microbiological testing and changes in animal husbandry as a way to fight *trichinae*, a tiny worm, in pork that is harmful to both animals and people. Also mandated that USDA inspect animals and meat to prevent the sale of sickened animals and rotten meat.

### Federal Meat Inspection Act of 1906

Mandated that all plants engaged in interstate commerce be subject to Federal inspection of live cattle, hogs, sheep, and goats just before slaughter and the carcasses afterward. Also required plants to use proper sanitation and labels on domestically shipped products.

### Poultry Products Act of 1957

Mandated that poultry plants be subject to inspection by the Federal Government.

### Wholesome Meat Act of 1967 and Wholesome Poultry Products Act of 1968

Extended FSIS oversight over State inspection agencies because of unsanitary conditions in some of those plants. Also extended FSIS oversight to include formerly unregulated plants in order to prevent the use of inexpensive fillers instead of meat or poultry in frozen meals, soups, and other packaged products that include meat or poultry as one component.

poultry products typically produce branded products that allow buyers to more easily associate product quality with a particular producer. Slaughter plants, on the other hand, generally produce generic ground hamburger, pork chops, and other raw meat products, making producer identification difficult. It is easier, however, for the market to identify and implicate large slaughter plants than small ones. Large plants are more likely to be exclusive suppliers to buyers that require strict food safety standards such as quality-conscious supermarkets, large-volume restaurant chains, and export markets. Large plants are also more likely to be caught producing off-quality products because more consumers eat their products, making the likelihood of sickness greater.

Market mechanisms in the form of more widespread use of brands and contracting for food safety, government oversight embodied in the PR/HACCP rule, and more stringent enforcement indicate that industry and FSIS are putting forth a great deal of effort to ensure the safety of meat and poultry products. A way to enhance food safety still further is to strengthen market forces by making information about a plant's food safety performance as readily available to consumers as the amount of fat and other commonly reported product attributes. Market forces could be further extended through greater product testing, the provision of test results to the public, and improvements in scientific methods that link foodborne illnesses to the producer.



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### Voluntary Quality Control Programs, 1980-85

Total Quality Control and Partial Quality Control programs shift some mundane inspection tasks and more responsibility for sanitation and process controls to industry. This frees FSIS inspectors from carcass inspection to pursue process control inspection.

### *E. coli* O157:H7 and *Listeria monocytogenes* declared adulterants, 1989-94

Because the two organisms can cause serious illness in humans, FSIS declared *E. coli* O157:H7 in ground beef and *Listeria monocytogenes* in ready-to-eat meat and poultry to be adulterants and adopted a zero tolerance policy.

### Pathogen Reduction/Hazard Analysis and Critical Control Point rule (promulgated in 1996 and fully implemented by January 2000)

Flexible but mandatory quality control program intended to focus plant food safety on preventing harmful pathogens from contaminating meat and poultry products.

### This article is drawn from . . .

Buzby, Jean, Paul D. Frenzen, and Barbara Rasco. *Product Liability and Microbial Foodborne Illness*, AER-799, USDA/ERS, 2001, available at: [www.ers.usda.gov/publications/aer799/](http://www.ers.usda.gov/publications/aer799/).

Ollinger, Michael, and Valerie Mueller. *Managing for Safer Food: The Economics of Sanitation and Process Controls in Meat and Poultry Plants*, AER-817, USDA/ERS, March 2003, available at: [www.ers.usda.gov/publications/aer817/](http://www.ers.usda.gov/publications/aer817/).

Ollinger, Michael, and Stephanie Chin. "Product Recalls and Plant Survival in the U.S. Meat and Poultry Industries." Unpublished working paper, USDA/ERS, 2002.

See also "Calculating the Cost of Foodborne Illness—A New Tool To Value Food Safety Risks," in this issue.

For more information on ERS' food safety research, visit: [www.ers.usda.gov/Emphases/SafeFood/](http://www.ers.usda.gov/Emphases/SafeFood/).